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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/619,796	07/15/2003	Francis X. Canning	CANNING.001CP2	7886

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KNOBBE MARTENS OLSON & BEAR LLP
2040 MAIN STREET
FOURTEENTH FLOOR
IRVINE, CA 92614

EXAMINER
DAY, HERNG DER

ART UNIT	PAPER NUMBER
2128	

NOTIFICATION DATE	DELIVERY MODE
10/19/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jcartee@kmob.com
eOAPilot@kmob.com

Office Action Summary	Application No.	Applicant(s).	
	10/619,796	CANNING, FRANCIS X.	
	Examiner	Art Unit	
	Herng-der Day	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 August 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *8/27/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This communication is in response to Applicant's RCE and Amendments and Response ("Amendment") to Office Action dated March 26, 2007, filed August 27, 2007.

1-1. Claims 1, 2, 9-14, and 17-23 have been amended. Claims 25-39 have been added. Claims 1-39 are pending.

1-2. Claims 1-39 have been examined and rejected.

Information Disclosure Statement

2. The information disclosure statement filed August 27, 2007, fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because the Cited documents No. 5-15 are not prior art and the prosecution on the merits of each related application is not closed. It has been placed in the application file, but the information referred to therein has not been considered as to the merits.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1, 21, and 30-32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not

described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

4-1. Independent claim 1 recites the limitations "reducing a rank of said matrix of transmitted disturbances to yield a second set of basis functions, said second set of basis functions corresponding to composite sources, each of said composite sources comprising a linear combination of one or more of said original basis functions" in lines 9-12 of the claim and "reducing a rank of said matrix of received disturbances to yield a second set of weighting functions, said second set of weighting functions corresponding to composite testers, each of said composite testers comprising a linear combination of one or more of said original testers" in lines 18-21 of the claim. However, without undue experimentation, it is unclear for one skilled in the art how to perform "reducing a rank" when each of said composite sources comprising a linear combination of one of said original basis functions or each of said composite testers comprising a linear combination of one of said original testers.

4-2. Independent claim 21 recites the limitations "reducing a rank of said matrix containing transmitted disturbances to yield a second set of basis functions, said second set of basis functions corresponding to composite sources, each of said composite sources comprising a linear combination of one or more of said original basis functions" in lines 10-13 of the claim. However, without undue experimentation, it is unclear for one skilled in the art how to perform "reducing a rank" when each of said composite sources comprising a linear combination of one of said original basis functions.

4-3. Claims not specifically rejected above are rejected as being dependent on a rejected claim.

5. Claims 2-8, 15-16, and 25 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

5-1. Independent claim 2 has been amended to recite "a plurality of alpha sub-blocks" and "a plurality of beta sub-blocks" in lines 12 and 14 of the claim, which does not appear to have support in the original disclosure. Applicant is required to provide support for this amendment.

5-2. Claims not specifically rejected above are rejected as being dependent on a rejected claim.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 9-14, 17-20, 22, 26-30, and 33-36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7-1. Claim 9 recites the limitation "said processor means" in line 13 of the claim. It is indefinite because it is unclear whether "said processor means" is referred to the "processor means" in line 2 of the claim or the "processor means" in line 11 of the claim.

7-2. Claim 22 recites the limitation "said interaction data" in lines 13 and 24-25 of the claim. There is insufficient antecedent basis for this limitation in the claim.

7-3. Claim 30 recites the limitation "said first matrix" in line 1 of the claim. There is insufficient antecedent basis for this limitation in the claim.

7-4. Claims 33-36 recite the limitation "The device" in line 1 of each claim. There is insufficient antecedent basis for this limitation in each claim.

7-5. Claims not specifically rejected above are rejected as being dependent on a rejected claim.

Claim Rejections - 35 USC § 101

8. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

9. Claims 1-39 are rejected under 35 U.S.C. 101 because the inventions as disclosed in claims are directed to non-statutory subject matter.

9-1. Claims 1-39 are directed to the manipulation of abstract ideas of data compression or factorization of an interaction matrix by applying a decomposition. This claimed subject matter lacks a practical application of a judicial exception (law of nature, abstract idea, naturally occurring article/phenomenon) since it fails to produce a useful, concrete, and tangible result.

As stated in the MPEP 2106 IV, "Likewise, a claim that can be read so broadly as to include statutory and nonstatutory subject matter must be amended to limit the claim to a practical application. In other words, if the specification discloses a practical application of a section 101 judicial exception, but the claim is broader than the disclosure such that it does not require a practical application, then the claim must be rejected." and "The tangible requirement does not necessarily mean that a claim must either be tied to a particular machine or apparatus or must operate to change articles or materials to a different state or thing. However, the tangible requirement does require that the claim must recite more than a 35 U.S.C. 101 judicial exception,

in that the process claim must set forth a practical application of that judicial exception to produce a real-world result. Benson, 409 U.S. at 71-72, 175 USPQ at 676-77 (invention ineligible because had "no substantial practical application.")."

Specifically, the claimed subject matter does not produce a tangible result because the claimed subject matter fails to produce a result that is limited to having real world value rather than a result that may be interpreted to be abstract in nature as, for example, a thought, a computation, or manipulated data. More specifically, the claimed subject matter provides for transforming a system of linear equations to produce a second system of equations or applying decomposition to a matrix. This produced result remains in the abstract and, thus, fails to achieve the required status of having real world value.

Furthermore, as described in the specification in lines 19-20 of page 8, "The terms "sources" and "physical sources" are used herein to include all types of actual and/or fictitious sources." Accordingly, even reciting "describing physical effects due to electric charges" in claim 2 and "each original source corresponding to an energy source" in claim 21, claims 1-39 are not for a particular practical application of the idea of compression of interaction data or applying decomposition to a matrix embodied therein but seeking to patent substantially every application of the idea of compression of interaction data or applying decomposition to a matrix, which is an attempt to patent the idea itself and is not permitted. Diehr, 450 U.S. at 191, 209 USPQ at 10. Benson, 409 U.S. at 71-72, 175 USPQ at 676; cf. Diehr, 450 U.S. at 187, 209 USPQ at 8.

Double Patenting

10. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

10-1. Claim 1 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 09/676,727 in view of Canning et al., Rockwell Inst. Sci. Center, "Fast Direct Solution of Standard Moment-Method Matrices", IEEE Antennas and Propagation Magazine, June 1998, pages 15-26.

The conflicting claims are all directed to a method of data compression. However, this instant application has additional limitations "identifying a plurality of sub-matrices in said transformed system of linear equations; and operating on said plurality of sub-matrices to solve said transformed system of linear equations". Canning et al. disclose in section 7 a method solving the MoM matrix using the sparse LU decomposition for an exemplary matrix having three blocks as shown in Figure 5. Using only the sparse representations of L and U to solve J, not only is the factorization process faster, the time to solve for each new excitation is also faster (page 24, right column, paragraph 1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of copending Application No. 09/676,727 to incorporate the teachings of Canning et al. because using only the sparse representations of L and U to solve J, not only is the factorization process faster, the time to solve for each new excitation is also faster.

10-2. This is a provisional obviousness-type double patenting rejection.

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Canning et al., Rockwell Inst. Sci. Center, "Fast Direct Solution of Standard Moment-Method Matrices", IEEE Antennas and Propagation Magazine, June 1998, pages 15-26, (IDS 17, filed October 14, 2003), hereinafter referred to as Rockwell.

12-1. Regarding claim 1, Rockwell discloses a method of data compression, comprising:

partitioning a first set of basis functions into groups, each group corresponding to a region, each basis function corresponding to one unknown in a system of linear equations, each of said basis functions corresponding to an original source (basis functions, page 16, left column, paragraph 1);

selecting a plurality of spherical angles (angle, page 15, right column, the last paragraph);

calculating a far-field disturbance produced by each of said basis functions in a first group for each of said spherical angles to produce a matrix of transmitted disturbances (matrix A, page 15, right column, the last paragraph);

using a computing system, reducing a rank of said matrix of transmitted disturbances to yield a second set of basis functions, said second set of basis functions corresponding to composite sources, each of said composite sources comprising a linear combination of one or more of said original basis functions (the SVD of A, page 16, left column, the last paragraph);

partitioning a first set of weighting functions into groups, each group corresponding to one of said regions, each weighting function corresponding to a condition, each of said weighting functions corresponding to an original tester (testing functions, page 16, left column, paragraph 1);

calculating a far-field disturbance received by each of said testers in a first group for each of said spherical angles to produce a matrix of received disturbances (matrix A, page 15, right column, the last paragraph);

reducing a rank of said matrix of received disturbances to yield a second set of weighting functions, said second set of weighting functions corresponding to composite testers, each of said composite testers comprising a linear combination of one or more of said original testers wherein said matrix of transmitted disturbances and said matrix of received disturbances are not identical; (the SVD of A, page 16, left column, the last paragraph; using SVD on a different A);

transforming said system of linear equations to use said composite sources and said composite testers (the matrix Z is replaced by a sparse representation of Z, page 16, left column, paragraph 4);

identifying a plurality of sub-matrices in said transformed system of linear equations (three blocks in Figure 5, page 21); and

operating on said plurality of sub-matrices to solve said transformed system of linear equations (solving the equation using the sparse LU decomposition, page 24, section 7.6).

Applicant's Arguments

13. Applicant argues the following:

13-1. Response to Rejection of Claims 1-24 Under 35 U.S.C. 101

(1) "All of the claims recite a result that is useful, concrete, and tangible. Methods that produce results stored in a computer are statutory and patentable if they meet the other requirements for patentability. (See, e.g., State Street Bank, 149 F.3d 1368 (Fed. Clr. 1998.)

Furthermore, all of the claims involve a structural relationship between compression and more efficient processing (See, e.g. Lowry, 32 USPQ2d 1031 (Fed. Cir. 1994)." (page 9, paragraph 4, Amendment).

13-2. Response to Rejection of Claim 1 Under Obviousness-Type Double Patenting

(2) "Applicant will timely file a terminal disclaimer should the provisional rejection be sustained once agreement is reached on the claims." (page 11, paragraph 2, Amendment).

13-3. Response to Rejection of Claims 1-4, 6-11 and 13-24 Under 35 U.S.C. 102(b)

(3) "In Rockwell, the basis and testing functions are not computed independently. … By contrast, Claim 1 recites computing composite sources using a first rank reduction and composite testers using a second rank reduction." (page 11, the last paragraph through page 12, paragraph 1, Amendment).

(4) "Regarding Claim 1, Rockwell does not teach or render obvious, separate rank reductions." (page 14, paragraph 3, Amendment).

(5) Regarding Claims 2, 9, and 21-23, Rockwell does not teach the claimed invention. (pages 14-17, Amendment).

13-4. Response to Rejection of Claims 5 and 12 Under 35 U.S.C. 103(a)

(6) The cited prior art does not teach or suggest claims 5 and 12. (page 18, Amendment).

Response to Arguments

14. Applicant's arguments have been fully considered.

14-1. Applicant's argument (1) is not persuasive. Claims 1-39 are currently rejected under 35 U.S.C. 101 as detailed in section **9-1** above because the claimed subject matter lacks a practical

application to produce a useful, concrete, and tangible result. Furthermore, claims 1-39 are not for a particular practical application of the idea of compression of interaction data or applying decomposition to a matrix embodied therein but seeking to patent substantially every application of the idea of compression of interaction data or applying decomposition to a matrix, which is an attempt to patent the idea itself and is not permitted.

14-2. Response to Applicant's argument (2), Double Patenting rejection will be withdrawn after a terminal disclaimer has been received.

14-3. Applicant's arguments (3) and (4) are not persuasive. Claim 1 recites the limitations "reducing a rank of said matrix of transmitted disturbances to yield a second set of basis functions, said second set of basis functions corresponding to composite sources, each of said composite sources comprising a linear combination of one or more of said original basis functions" in lines 9-12 of the claim and "reducing a rank of said matrix of received disturbances to yield a second set of weighting functions, said second set of weighting functions corresponding to composite testers, each of said composite testers comprising a linear combination of one or more of said original testers" in lines 18-21 of the claim. Because each of said composite sources may comprise a linear combination of only one of said original basis functions and each of said composite testers may also comprise a linear combination of only one of said original testers, the argued "separate rank reductions" cannot be performed effectively without undue experimentation as detailed in section **4-1** above.

14-4. Applicant's arguments (5) and (6) are persuasive. The rejections of claims 2-24 under 35 U.S.C. 102(b)/103(a) in Office Action dated March 26, 2007, have been withdrawn.

Conclusion

15. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Herng-der Day whose telephone number is (571) 272-3777. The Examiner can normally be reached on 9:00 - 17:30.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: (571) 272-2100.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kamini S. Shah can be reached on (571) 272-2279. The fax phone numbers for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Herng-der Day
October 12, 2007 H.D.

KAMINI SHAH
SUPERVISORY PATENT EXAMINER